

## Barium

CAS No. 7440-39-3

### General Information

Elemental barium is a silver-white metal. In nature, it combines with other chemicals such as sulfur or carbon and oxygen. Barium compounds are used by the oil and gas industries to make drilling muds. These compounds are also produced commercially for use in paint, bricks, tiles, glass, rubber, depilatories, fireworks, and ceramics. Medically, barium sulfate is used as a contrast medium for taking X-rays of the gastrointestinal tract. Barium sulfate is insoluble and not absorbed.

People can be exposed to barium in air, water, and food. The health effects of barium compounds depend on the dose, the chemical form, and water solubility. Workers employed by industries that make or use barium compounds are exposed to barium dust. Chronic accumulation of inhaled barium dust in the lung tissue may cause baritosis, a benign condition that may occur among barite ore miners. Workplace standards for external air exposure to various barium salts have been established (OSHA). Barium is considered unlikely to be carcinogenic (U.S. EPA, NTP). Information about external exposure (environmental levels) and health effects is available from the EPA IRIS Web site at <http://www.epa.gov/iris> and from ATSDR at <http://www.atsdr.cdc.gov/toxprofiles>.

**Table 17. Barium**

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
<b>Total, age 6 and older</b>	1.15 (.960-1.38)	< LOD	.600 (.400-.700)	1.40 (1.30-1.60)	2.70 (2.50-3.10)	5.30 (4.40-5.80)	6.60 (6.00-8.30)	2465
<b>Age group</b>								
6-11 years	1.62 (1.28-2.06)	< LOD	1.00 (.700-1.20)	2.00 (1.60-2.30)	3.70 (2.60-5.50)	6.10 (3.80-8.30)	8.00 (5.60-40.8)	340
12-19 years	1.43 (1.15-1.79)	< LOD	.800 (.500-1.00)	1.70 (1.50-2.10)	3.20 (2.80-3.70)	5.40 (4.50-6.40)	9.10 (5.90-12.9)	719
20 years and older	1.06 (.881-1.28)	< LOD	.400 (.300-.600)	1.40 (1.20-1.60)	2.70 (2.40-3.00)	4.80 (4.00-5.30)	6.10 (5.30-7.10)	1406
<b>Gender</b>								
Males	1.28 (1.02-1.60)	< LOD	.600 (.400-.900)	1.70 (1.40-1.90)	3.10 (2.60-3.30)	5.30 (4.40-6.20)	6.70 (5.90-8.40)	1227
Females	1.04 (.873-1.24)	< LOD	.400 (.300-.600)	1.20 (1.00-1.50)	2.60 (2.20-2.80)	4.90 (4.00-5.60)	6.70 (5.60-8.50)	1238
<b>Race/ethnicity</b>								
Mexican Americans	.695 (.500-.966)	< LOD	.300 (<LOD-.500)	.900 (.600-1.20)	2.10 (1.70-2.70)	4.00 (3.30-4.50)	5.60 (4.50-6.50)	884
Non-Hispanic blacks	1.08 (.795-1.48)	< LOD	.600 (.300-.800)	1.30 (1.10-1.50)	2.30 (2.00-2.80)	5.00 (3.70-6.20)	7.00 (5.20-10.4)	568
Non-Hispanic whites	1.24 (1.02-1.51)	< LOD	.600 (.400-.800)	1.60 (1.30-1.80)	3.00 (2.70-3.30)	5.40 (4.50-6.10)	6.80 (6.10-8.80)	822

< LOD means less than the limit of detection, which is 0.08 µg/L.

## Interpreting Urine Barium Levels Reported in the Tables

Urine barium levels were measured in a subsample of NHANES participants aged 6 years and older. Subsamples were randomly selected within the specified age range to be a representative sample of the U.S. population. Measuring barium at these levels in urine is possible because of advances in analytical chemistry. Finding a measurable amount of barium in urine does not mean that the level of barium causes an adverse health effect. Previous studies reporting urinary levels of barium in normal populations have found values roughly similar to those reported in this *Report* (Minoia et al., 1990; Paschal et al., 1998). In addition, levels determined in clinically submitted specimens are broadly

similar (Komaromy-Hiller et al., 2000). Median levels in welders of electrodes containing barium were 60 times higher than the median reported below (Zschiesche et al., 1992) without obvious health effects.

In the current NHANES 1999-2000 subsample, geometric mean levels of the demographic groups were compared after adjustment for the covariates of race/ethnicity, age, gender, and urinary creatinine. Urinary barium levels were higher for the 6-11-year-old group than for either the 12-19 year-old or 20 years and older age groups, and levels in the 12-19-year-old group were higher than in the 20-year-old and older age group. Urinary barium levels in females were higher than in males, and levels in non-Hispanic whites were higher

**Table 18. Barium (creatinine adjusted)**

Geometric mean and selected percentiles of urine concentrations (in µg/gram of creatinine) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
<b>Total, age 6 and older</b>	1.08 (.904-1.30)	< LOD	.651 (.521-.779)	1.29 (1.18-1.43)	2.38 (2.11-2.64)	4.44 (3.88-5.00)	6.10 (5.39-7.62)	2465
<b>Age group</b>								
6-11 years	1.78 (1.32-2.40)	< LOD	1.12 (.667-1.47)	2.05 (1.76-2.55)	4.40 (2.84-5.00)	7.02 (4.06-22.0)	10.3 (5.60-22.0)	340
12-19 years	1.08 (.849-1.37)	< LOD	.722 (.581-.862)	1.30 (1.15-1.47)	2.21 (1.89-2.91)	4.24 (3.23-5.00)	6.38 (4.24-11.4)	719
20 years and older	1.02 (.850-1.22)	< LOD	.600 (.462-.744)	1.20 (1.11-1.33)	2.14 (2.00-2.42)	4.07 (3.50-4.76)	5.59 (5.10-6.27)	1406
<b>Gender</b>								
Males	.999 (.810-1.23)	< LOD	.613 (.444-.766)	1.24 (1.11-1.40)	2.22 (1.95-2.55)	3.93 (3.39-4.77)	5.47 (4.44-6.46)	1227
Females	1.17 (.979-1.40)	< LOD	.667 (.536-.833)	1.33 (1.22-1.48)	2.54 (2.14-2.96)	4.80 (4.09-5.60)	6.94 (5.39-9.28)	1238
<b>Race/ethnicity</b>								
Mexican Americans	.642 (.472-.872)	< LOD	.267 (.098-.514)	.830 (.645-1.09)	1.98 (1.56-2.43)	3.44 (2.84-4.40)	4.95 (4.06-5.83)	884
Non-Hispanic blacks	.704 (.506-.979)	< LOD	.383 (.250-.526)	.824 (.643-1.00)	1.53 (1.29-1.90)	3.04 (2.35-3.98)	4.67 (3.57-7.22)	568
Non-Hispanic whites	1.24 (1.02-1.52)	< LOD	.766 (.599-.935)	1.45 (1.27-1.61)	2.57 (2.23-2.99)	4.80 (3.97-5.59)	6.46 (5.45-9.28)	822

< LOD means less than the limit of detection (see previous table).

than in non-Hispanic blacks or Mexican Americans. It is unknown whether differences between ages, genders, or races/ethnicities represent differences in exposure, body-size relationships, or metabolism.

Whether barium at the levels reported here is a cause for health concern is not yet known; more research is needed. These urine barium data provide physicians with a reference range so that they can determine whether people have been exposed to higher levels of barium than those found in the general population. These data will also help scientists plan and conduct research about exposure to barium and health effects.